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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year Examinations, June - 2015
ENGINEERING MECHANICS
(Common to CE, ME, CHEM, MMT, AE, AME, MIE, PTE, MSNT, AGE)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
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1.a) Prove that the moment of couple is independent of moment of centre.
 b) Differentiate between collinear and concurrent forces.   [9+6]

2.a) What are the graphical conditions of equilibrium?
 b) Two smooth spheres of weight W and radius 'r' are in equilibrium in a horizontal channel of width b (<4r) and smooth vertical sides as shown in figure 1. Find three reactions from the sides of the channel which are all smooth. Also find the force exerted by each sphere on the other given r=250 mm and b=900 mm and W=9kN.   [5+10]
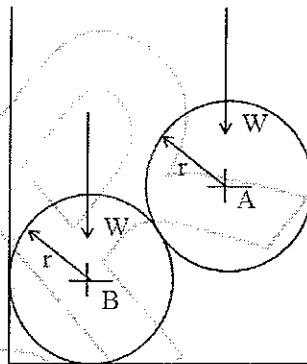

Figure: 1

3. A solid steel cone is made lighter by removing a part of material form it in the form of a cylinder as shown in the figure 2. Determine the position of centre of gravity of the remaining metal.   [15]
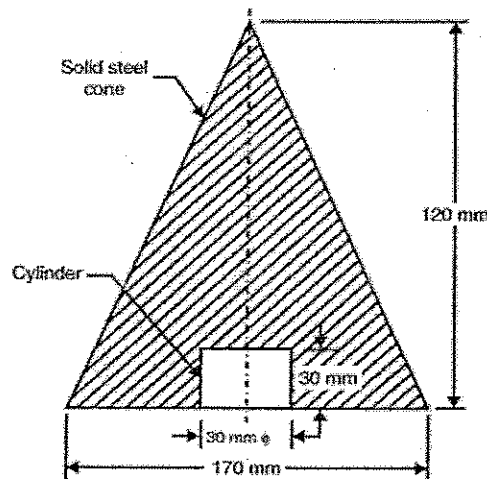

Figure: 2

4.a) State and explain the Theorem of parallel axes.
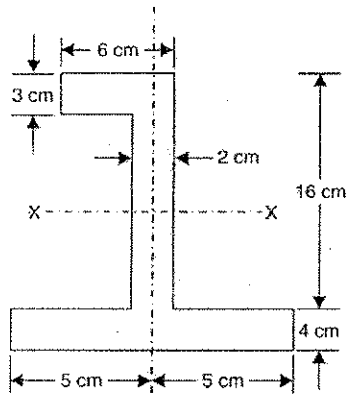 b) Find the moment of inertia about the centroidal axis XX for the lamina shown in the figure 3.   [6+9]

Figure: 3

5. Determine the forces in the members FH, HG, GI in the truss shown in the figure 4. Each load is 10kN and all triangles are equilaterals with sides equal to 4m. [15]
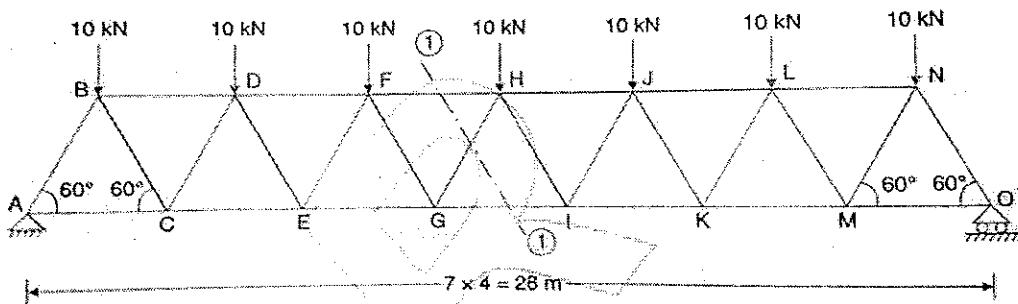

Figure: 4

6.a) State the component forms of the kinetic equation for rectilinear motion.

b) A ball is thrown down the incline and strikes it at a distance s=75m. If the ball rises to a maximum height h=18m above point of release, compute its initial velocity and inclination θ. [5+10]

7. The bar shown in the figure 5 weighs 100 N/m and is free to rotate in the vertical plane about the horizontal axis passing through A. If the bar is released from rest at the given position determine its angular velocity at the instant it has rotated through 90^0. [15]
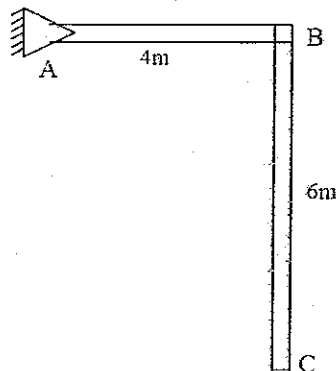

Figure: 5

8.a) Define the virtual work. Explain the principle of virtual work.

b) What are the advantages of virtual work method? [9+6]

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